

PROCEEDINGS  
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ANOTHER NEW LARGE *ELEUTHERODACTYLUS*  
(AMPHIBIA: LEPTODACTYLIDAE) FROM  
WESTERN CUBA

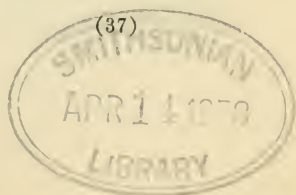
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During the Christmas holiday season of 1956, a small obviously immature *Eleutherodactylus* was collected by Messrs. John R. Feick, William H. Gehrmann, Jr., and the writer at San Vicente, Pinar del Río Province, Cuba. Other leptodactylid material in the same collection has been reported upon (Schwartz, 1958). During the summer of 1957, under a National Science Foundation grant, three weeks were spent at San Vicente, in the hope that additional and adult specimens of this frog might be obtained. Such was indeed the case; on the night of June 18, a large gravid adult female was taken by Mr. Feick and during the following weeks, additional adult and subadult specimens were collected. There are thus at hand 11 specimens of this remarkable new species.

I wish to thank Mr. Dennis R. Paulson, as well as Messrs. Feick and Gehrmann for their assistance in the pursuit of amphibians in the San Vicente region. Without their cordial assistance, such a series of the new form would certainly not have been taken. Dr. Richard G. Zweifel of the American Museum of Natural History has offered me advice from his knowledge of Central American eleutherodactyli, and I am grateful to him for this assistance.

The Cuban *Eleutherodactylus* have been summarized by myself (*op. cit.*); since the time of my summary, a new species, *E. symingtoni*, has also been described from Pinar del Río Province. The Cuban leptodactylids are presently separated into five groups, each with its own combination of characteristics; these groups are the *auriculatus*, *varleyi*, *ricordi*, and *dimidiatus* (all *sensu* Dunn, 1926, p. 210), and the *symingtoni* group (Schwartz, 1957). The new large species is not assignable with certainty to any of the five existing species groups. Its affinities are close to the *auriculatus* group, but it differs from that assemblage of five species (*auriculatus*, *sonans*, *eileenae*, *varians*, *gehrmanni*) by absence of a rugose belly. It may be placed with equal propriety in the *symingtoni* group, although the new species has enlarged digital discs and *symingtoni*



lacks them. Insofar as known, all members of the *auriculatus* group are arboreal, and all have enlarged digital discs; although the new species possesses very large digital discs, it is not known to be a tree climber, and is, on the other hand, petricolous and clivicolous in its activities. The new species may be called

***Eleutherodactylus zeus*, new species**

Figure 1

*Type*: American Museum of Natural History (A.M.N.H.) No. 60791, taken 0.5 miles south of San Vicente, Pinar del Río Province, Cuba, by John R. Feick, on June 18, 1957. Original number 1627.

*Paratypes*: A.M.N.H. No. 60792, same data as type, A. Schwartz; A.M.N.H. No. 60793, cliffs at Cueva del Río, San Vicente, Pinar del Río Province, J. R. Feick, June 20, 1957; A.M.N.H. Nos. 60794-96, cliffs at Cueva del Río, San Vicente, Pinar del Río Province, J. R. Feick, W. H. Gehrmann, A. Schwartz, June 23, 1957; A.M.N.H. No. 60797, cliffs at Cueva del Río, Pinar del Río Province, D. R. Paulson, June 26, 1957; A.M.N.H. No. 60798, cliffs at Cueva del Río, San Vicente, Pinar del Río Province, J. R. Feick, July 1, 1957; A.M.N.H. Nos. 60799-800, cliffs at San Vicente, Pinar del Río Province, J. R. Feick, W. H. Gehrmann, July 7, 1957; A.M.N.H. No. 59829, San Vicente, Pinar del Río Province, J. R. Feick, W. H. Gehrmann, A. Schwartz, December 21, 1956.

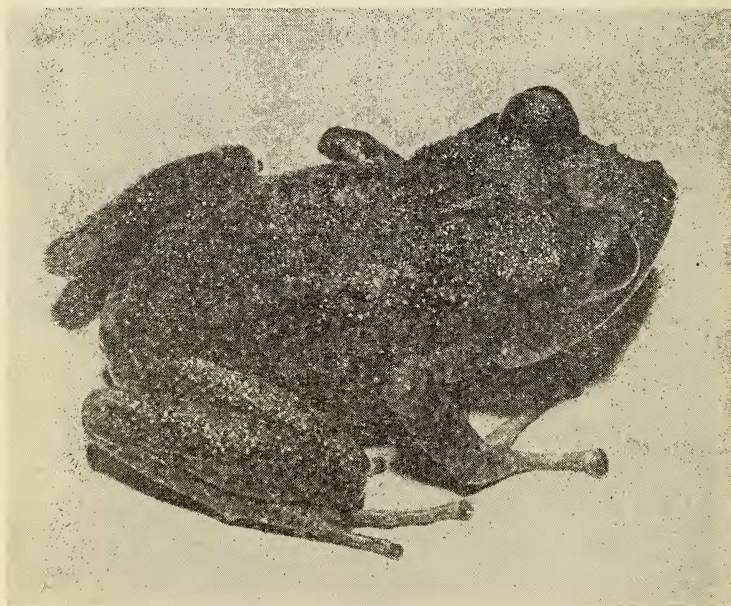


Figure 1. *Eleutherodactylus zeus*, adult female, paratype, A.M.N.H. No. 60792, snout-vent length 79.8 mm. taken in life by William H. Gehrmann, Jr.; specimen from 0.5 miles south of San Vicente, Pinar del Río Province, Cuba.

*Distribution:* Known only from the type locality and its environs, in the vicinity of San Vicente, Pinar del Río Province, Cuba.

*Diagnosis:* An *Eleutherodactylus* characterized by very large size, greatly enlarged digital discs, smooth belly, finely rugose or shagreened dorsum, two enlarged canthal tubercles, short vomerine tooth series, and olive green to brown dorsum with a pair of pale yellow postscapular spots.

*Description of type:* An adult female, with the following measurements (all measurements in millimeters): snout-vent length, 83.0; head length (snout to posterior border of tympanum), 34.2; greatest width of head, 36.7; longitudinal diameter of eye, 8.9; longitudinal diameter of tympanum, 5.9; naris to anterior corner of eye, 11.7; femur, 40.2; tibia, 42.0; length of fourth toe, 37.7. Head slightly broader than distance from snout to posterior border of tympanum; snout decidedly truncate, with nares prominent at anterior end of canthus rostralis; canthus rostralis with two large, and one to three smaller, pronounced pointed canthal tubercles; diameter of eye somewhat less than distance from naris to anterior corner of eye; interorbital space 11.7, greater than diameter of eye; diameter of tympanum much less than diameter of eye, distance from tympanum to eye about equal to diameter of tympanum; tympanum oval, its vertical diameter greater (7.9) than its horizontal (5.9). Digital discs present, large, that on fourth toe largest, equal to about one half size of tympanum. Fingers extremely long and slender, unwebbed, 3-4-2-1 in order of decreasing length; sub-articular tubercles well developed. Toes long and slender, unwebbed, 4-3-5-2-1 in order of decreasing length. Heels barely touch when legs are held with femora at right angles to body axis. Dorsum extremely and minutely rugose, rugosities extending from snout over lores, dorsal surface of head and body, thigh, crus, and hindfoot, those on head and in area of eyes somewhat larger and more prominent; a raised fine median middorsal line. Dorsal tubercles small and evenly spaced, with those on canthal line especially large and prominent; general aspect of dorsum a finely shagreened appearance; upper eyelids minutely tuberculate. Throat smooth; venter smooth with belly disc feebly developed. Posterior and ventral surfaces of thighs covered with large, flattened, indistinct pavement-like granules. Tongue oval, free behind, its greatest width about half of that of floor of mouth. Vomerine teeth in two short, stout, slightly curved series, that on the right side much shorter than that on left; vomerine teeth extending medially from just within the level of the interior edge of the choanae, and widely separated from each other by a distance equal to that of the larger left series, and separated from choanae by a distance equal to about half the length of the larger series.

Coloration of type (based on color notes taken in the field and on Kodachrome photographs): Dorsum olive green (Pl. 16, H10; color designations from Maerz and Paul, 1950), more brown than green, and faintly mottled with black; snout darker brown; poorly defined black interocular bar; a postscapular faintly yellowish spot on each side; tips of dorsal rugosities greenish or yellowish, giving a somewhat speckled and mottled appearance; arms and thighs with lichenous grayish markings; concealed surfaces of thighs dull brownish purple; dorsum of thighs mottled brown; digits pale dusky green; venter dusky, especially on throat, which possesses a raised median midventral line from mandibular symphysis to pectoral girdle; all subarticular tubercles gray.



*Variation:* Of the series of paratypes, there are three adult females, two adult males, one subadult female, three subadult males, and one juvenile (snout-vent length, 15.9). The adult males (A.M.N.H. Nos. 60794, 60798) have the following measurements: snout-vent length, 63.7, 62.4; head length, 25.9, 25.2; greatest width of head, 25.5, 24.5; diameter of eye, 7.9, 7.6; diameter of tympanum, 5.5, 4.8; naris to eye, 9.3, 8.2; femur, 28.2, 28.2; tibia, 30.2, 27.9; length of fourth toe, 26.7; 26.9. The three adult females (A.M.N.H. Nos. 60792, 60796-97) are all somewhat smaller in snout-vent length than the type, but numbers 60792 and 60796 are both gravid, and thus can be considered fully adult. The measurements on these three specimens are: snout-vent length, 79.8, 74.3, 69.2; head length, 31.4, 30.3, 28.1; greatest width of head, 33.0, 31.3, 28.3; diameter of eye, 8.2, 8.3, 7.3; diameter of tympanum, 5.1, 5.4, 5.0; naris to eye, 10.5, 10.5, 9.6; femur, 33.5, 35.0, 33.6; tibia, 36.0, 36.0, 35.1; length of fourth toe, 32.7, 31.5, 32.0. The subadult specimens of both sexes range in snout-vent length between 37.4 and 47.0. I can determine no sexual dimorphism in this lot of specimens, other than the smaller adult size of the males. The tympana do not appear to be smaller in either sex, and both sexes are colored alike.

The coloration of *E. zeus* is remarkably constant for an *Eleutherodactylus*. All were colored olive brown in life with a mottled black dorsum. Although not specifically noted on the type, the upper eyelids of most specimens were recorded as being clear green (Pl. 16, L3 in number 60793). The postscapular spots are yellowish, varying from a very pale yellow to a more intense pigment, but never bright. In one adult female (A.M.N.H. No. 60797), the pale yellow postscapular spots were more extensive and pale yellow dorsolateral fields were apparent, but obscure. This female also has a more definite interocular bar and a dusky V on the snout, the apex of the V almost merging with the interocular bar. Ventrally, both adult males and females have a brownish throat, and a lighter dusky brownish smooth belly.

The subadults are colored much as the adults, except that there is a rather well defined dark brown interbrachial bar, and the remainder of the dorsum appears more heavily mottled with black or brown. The crus is occasionally transversely banded with dull brown, the bands separated by faint whitish rows of dots. The juvenile individual has a dark brown interocular bar and a dark brown interbrachial bar, outlined anteriorly with dirty white; the crus is prominently transversely banded with three or four light tan bands separated by fine white lines.

Structurally, the paratypes agree closely with the type. The vomerine series is always short and stout, and the digital discs are always large. The dorsum is shagreened and there are two canthal tubercles in all specimens except the juvenile, which lacks them and also has an almost smooth dorsum. The canthal tubercles are better developed in adults, but are nonetheless indicated in subadult specimens.

*Comparisons:* *E. zeus* requires comparison with no other Cuban *Eleutherodactylus* by virtue of its very distinctive combination of canthal spines, large size, and very large digital discs. The only other Cuban leptodactylids which are large (yet, so far as known, do not reach the maximum known size of *zeus*) are *E. greyi* Dunn and *E. symingtoni* Schwartz. Of these, the former is not known from Pinar del Río Province; it also is a member of the *ricordi* group, and thus has the digital discs

feebly developed or restricted to the outer two fingers, and a long vomerine series. *E. symingtoni*, on the other hand, is known only from one specimen from Pinar del Río Province; although this specimen is close to the size of *zeus*, *symingtoni* differs in having a very rugose, rough dorsum, orange vermiculations on the hindlimbs, absence of digital discs, and dark brown venter. Both resemble each other in large size and presence of canthal tubercles, although these are much more prominent in *zeus* than in *symingtoni*. In the latter species, the canthal tubercles are not only less strikingly developed, but are more or less obscured by the heavily rugose dorsum.

*Remarks:* *E. zeus* is typically a petricolous or clivicolous species. Only one specimen was taken on soil, the remainder being collected from rocks or cliffs, and, in one instance, from a fallen decaying log in deciduous woods. The combination of rocky or cliffy areas with dense deciduous growth is the precise niche which this frog inhabits, and the *mogote* section of Pinar del Río is typified by this association. The mottled coloration blends well with the irregular rocky surfaces which *zeus* inhabits. The Sierra de los Organos, in which mountain range *zeus* is found, is the area with the highest rainfall in Cuba. Conditions are always very mesic, and the humidity at night is consistently high. Even after a dry day, which is unusual in summer in these mountains, the leaf litter and rocks are extremely moist, and, in sheltered areas and solution holes in the limestone, small quantities of rainwater persist from the last rain. No specimens of *E. zeus* were collected during the day, despite persistent overturning of logs and limestone chunks; I suspect that the diurnal retreat of these frogs is in the deep crevices in the high cliffs of the *mogotes* in this region. In affirmation of this postulation, one individual was collected in a narrow but deep crevice on the cliff face at night; in the same crevice was a large roach (*Eurycotis*). *Eleutherodactylus zeus* feeds upon these large roaches; the type specimen disgorged a recently taken roach when it was collected. Although there are no evidences of predation upon *zeus*, the cliffs are inhabited by a large tarantula and by the arachnid *Phrynus*, and almost certainly these arthropods capture and eat the frogs. At Soroa, in Pinar del Río Province and in the Sierra de los Organos, I witnessed the capture of a small *Eleutherodactylus* by *Phrynus*, and this lends credence to the supposition that this arachnid feeds at least in part on frogs which inhabit cliffs along with it.

In disposition, *E. zeus* is lethargic, and allows the collector's approach without alarm. Once disturbed, it shows itself to be a powerful jumper, and invariably escapes capture by leaping away among the rocks which it inhabits. One specimen, when disturbed, escaped by ascending a vertical cliff face with ease.

The assignment of *E. zeus* to one of the five recognized groups of Cuban eleutherodactyli is difficult. It appears to be related to the *auriculatus* group in possessing all the features of that assemblage of species except a rugose belly. On the other hand, it resembles the *symingtoni* group in all characteristics except that *zeus* possesses digital discs which are absent in *symingtoni*. *E. zeus* thus seems to bridge the gap between the *auriculatus* and *symingtoni* groups, and its precise affinities are problematical. I regard it however as being closer to the latter than to the former; both *zeus* and *symingtoni* are large frogs

with short vomerine series, canthal tubercles, shagreened or heavily rugose dorsa, smooth bellies, and mottled dorsal coloration. They differ in degree of development of the canthal spines, color of concealed surfaces of thighs, presence of digital discs in *zeus*, and degree of development of dorsal rugosities. Of these differences, only the digital discs present a serious problem, and for the moment it seems satisfactory to regard *zeus* as a specialized climbing derivative of the same stock to which *symingtoni* is also related. Thus, I regard *zeus* as a member of *symingtoni* group.

The degree of endemism in amphibians and reptiles in the Sierra de los Organos is interesting. Aside from these two strikingly different species of *Eleutherodactylus*, the montane areas of Pinar del Río are inhibited by other endemic species; among them may be mentioned the lizards *Deiroptyx vermiculatus* and *D. bartschi*, and the snake *Tropidophis feicki*. The distribution of *Cadea blanoides* and *Eleutherodactylus gehrmanni* are poorly known, but the former appears to have had the western mountain mass as a center of dispersal, and the latter is probably restricted to the montane areas of Pinar del Río Province.

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